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INDUSTRIAL PRODUCTION, PRODUCTIVITY AND DISTRIBUTION IN BRITAIN, GERMANY AND THE UNITED STATES [1]

THE publication of the first comprehensive Census of Production in Germany, undertaken in 1937 [2]—which fortunately follows very closely the pattern of the British and American Censuses—makes it possible to compare, on a comprehensive scale, the scope, structure and the productivity of manufacturing industries of the three leading industrial countries: Britain, Germany and the United States.[3]

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[1] The present paper was prepared in connection with an enquiry now in progress by the National Institute of Economic and Social Research.

[2] *Die deutsche Industrie.* Gesamtergebnisse der amtlichen Produktionsstatistik. Berlin, 1939 (Schriftenreihe des Reichsamts fuer wehrwirtschaftliche Planung Heft 1). Prior to the publication of this comprehensive Census, similar data were collected from time to time for a great many individual industries, such as mining, iron and steel trades, textile trades, etc., by the Central Statistical Office. The needs of war economics made a comprehensive Census necessary, which task was entrusted to the newly created Office of Planning for War Economy. The Report on German Industry—quoted above—is the first publication of the new office. Further reports dealing with special industries were announced, but so far not published. Apart from Censuses of individual industries, there were, prior to the comprehensive Census, two comprehensive official enquiries into employment in industry: the one was the so-called "Gewerbezaehlung," a Census of establishments and persons working in manufacturing and handicraft, undertaken in two yearly intervals, the latest available for 1936; the other the so-called Industrieberichterstattung, an enquiry in industrial employment and earnings, undertaken yearly on a broad sample basis, the samples covering more than the half of all persons employed (vide *Wirtschaft und Statistik*, 1938, Nr. 8, and 1939, Nr. 8). None of these, however, contains information on output or costs.

[3] The scope of the three Censuses is largely similar, though not identical. The British Census of 1935 covers all firms employing on the average more than ten persons (except for Northern Ireland). The American Census of Manufactures for 1935 and 1937 covers all factories or plants whose products were valued at $5,000 or more (it covers thus slightly a wider field than the British Census). The German Census covers broadly all firms with five or more employees, though in certain industries other criteria, like capacity, value of production, etc., were used. The American Census covers factory trades only as defined in the British Census, thus excludes mining, building and contracting, and public utilities. The scope of the German Census is identical in this respect with the British. In order to obtain comparative figures, we confined ourselves for all three countries (unless stated otherwise) to factory trades only.

Gross output (value of products in the American terminology), net output (value added by manufacture in the American terminology), costs of materials, fuel and electricity, etc., used are defined in all three Censuses in the same manner. Indirect taxes are treated similarly in the British and American Census; thus they are included in gross output, but excluded in all cases from net output. In the German Census indirect taxes are excluded from both gross output and net output. Wages bills were compiled in the American Census, The purpose of the present paper is to show how the scope of manufacturing production, the scale and composition of the labour force, the relative importance of different industry groups, the ratio of profits to wages and industrial efficiency as measured by output per head, compares with one another in these three countries. We shall summarise the most significant results of this comparison, without making any attempt to trace the causes of either the similarities or the divergences.

The German data relate to 1936. The most comparable British data are those for the Census of Production 1935, and the American data are those for the Censuses of Manufactures 1935 and 1937.[1] The fact that for the United Kingdom data relating to 1935 have to be used (and not 1936 or 1937) makes the comparison somewhat unfavourable to this country. It must also be borne in mind that the importance of rearmament was much greater in the manufacturing industry of Germany in 1936 than in those of the two other countries in 1935 or 1937.[2] Since that time the industrial production of all three countries has expanded considerably, and the structure of production (*i.e.*, the relative importance of different branches of industry) has altered even more, owing to the war. It is not likely, however, that the developments since 1935–37 would considerably modify the broad picture which emerges from our comparisons as to the relative capacity and efficiency of the industries of these three countries.

The results of our investigation given in Tables I–X below can be summarised as follows :

A. *The Scale of Manufacturing Production* (Tables I–III)

(i) The labour force employed in Britain's manufacturing industry was over 5 millions (in 1935), in Germany 6 millions

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wages and salary bills combined in the German Census, while in the British Census wages bills are available only for a sample covering 50–60 per cent. of the firms reporting in the Census, and were assumed to be in the same proportion in the remaining firms.

[1] The U.S. data for 1937 are more representative for purposes of comparison, since in 1935 American industry was still in a state of depression as compared with the German and British industry (vide Table VIII).

[2] 1936 was the year when the first Four-Years Plan, initiated in 1933 for creation of public works, came to an end, largely fulfilling its purpose, and the second Four-Years Plan was initiated. *Ersatz* industries created under the second Four-Years Plan therefore did not become a significant factor until after 1936. Rearmament was, however, the mainspring of industrial boom since early 1935. Also Dr. Schachts' so-called New Plan (of foreign trade and exchange) in force since 1934 has some importance, by curtailing imports, thus preventing the expansion of the consumers' goods industries (vide M. Y. Sweezy, *The Structure of the Nazi Economy.* Cambridge, Mass., 1941).

TABLE I

Summary Results of the Censuses of Production in the United Kingdom, Germany and the United States

(Factory trades only)

	United Kingdom, £.	Germany, Rm.	United States, $.
	A. In millions of national currency		
Gross output	2,837·0 (1935)	50,610·1 (1936)	44,993·7 (1935) 60,712·9 (1937)
Net output	1,182·0 (1935)	25,711·7 (1936)	18,552·6 (1935) 25,173·5 (1937)
	B. In millions of £		
Gross output	2,837·0	2,963·0	9,182·0 (1935) 12,290·0 (1937)
Net output	1,182·0	1,505·4	3,786·0 (1935) 5,096·0 (1937)

SOURCES:

BRITAIN. *Final Reports on the Fifth Census of Production and the Import Duties Act Inquiry,* 1935, and *Fifth Census of Production,* 1935, and Final Summary Tables. Issued by the Statistics Dept. of the Board of Trade. (1942) (Mimeographed).

GERMANY. *Die Deutsche Industrie, op. cit.*

U.S.A. *Statistical Abstract of the United States,* 1940, p. 802.

Note.—The rate of conversion used was £1 = $4.90 for 1935 and £1 = $4.94 for 1937. Rms. were converted at £1 = Rm. 17.08.

(in 1936) and in the United States almost 10 millions (1937). The *potential labour force,* obtained by including the number of unemployed in these industries in the Census years quoted above, gives 5·9–6 millions for Britain, 6·8–7 millions for Germany and 12–13 millions for the United States.[1]

The preponderance of manufacturing industry in Britain is shown by the fact that these figures represent one-fourth of the total occupied population of Britain and only one-fifth of the occupied population of Germany and the United States. The proportion of occupied population to total population is slightly higher in Germany than in this country, but a greater proportion is in agriculture and handicraft. In America the proportion of those gainfully occupied is lower than in both other countries, and

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[1] The number of unemployed in the Census industries can be estimated, on basis of official statistics, at 920,000 for Great Britain (Dec. 1935), and 860,000 for Germany (Dec. 1936), not allowing for unemployed salaried employees. In the United States the number of persons who registered in the Unemployment Census in Nov. 1937 amounted in the Census industries to 1·7 million wholly unemployed and 1 million partially unemployed. No exact figures of the potential labour force can be given, since the Census employment data are yearly averages for Britain and the U.S., and refer to end of June 1936 in Germany, while available unemployment data refer to the end of the year. The availability for employment in manufacturing is also affected by those employed by small firms or in handicraft which are not included in the above figures. There were some 537,000 persons employed in 1935 in small manufacturing firms n this country, according to the Census reports, which are not included in the above figures of total employment.

TABLE II

Employment in Manufacturing Production [1]

(In millions)

	United Kingdom.	Germany.	United States.
1. Population [2]	46·1 (1931) 46·9 (1935)	65·2 (1933) 67·3 (1936)	123·1 (1930) 127·5 (1935) 129·3 (1937)
2. Occupied population [2]	21·6 (1931)	32·6 (1933)	48·8 (1930)
3. Population occupied in manufacturing and mining, including building and construction, and public utilities [2]	10·4 (1931)	13·7 (1933)	15·1 (1930) [2] 17·2 (1930) [3]
4. Persons employed in factory trades [4] .	5·2 (1935)	6·0 (1936) [4] 7·2 (1936) [5]	8·3 (1935) 9·8 (1937)
4*a*. Operatives employed in factory trades [4] .	4·5 (1935)	5·1 (1936)	7·2 (1935) 8·6 (1937)
5. Persons employed in factory trades by firms with more than 50 employees . .	4·6 (1935) [6]	5·5 (1936) [5]	—
5*a*. Operatives employed in factory trades with more than 50 operatives [4]	—	—	5·8 (1935) 7·1 (1937)
6. Persons employed in manufacturing production, including mining, building and public utilities [4]	7·3 (1935)	8·0 (1936) 9·1 (1936) [7]	—
6*a*. Operatives employed in manufacturing production, including mining, building and public utilities [4]	6·5 (1935)	6·8 (1936)	—

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[1] The occupational statistics of the Censuses of Population (items 1–3 above) include persons whether employed or unemployed, while the Censuses of Production (items 4–6 above) include only persons actually employed. Differences between the two Censuses are, however, due not only to unemployment, but also to differences in definitions.

[2] SOURCE: last Census of Population for the Census years (1931 in Britain, 1933 in Germany, and 1930 in the United States). For later years official estimates.

BRITAIN. *Statistical Abstract for the United Kingdom*, 1913–37, p. 4, and pp. 125–8. The 1931 Census data for Great Britain were supplemented by the 1926 Census data for Northern Ireland.

GERMANY. *Statistisches Jahrbuch fuer das deutsche Reich*, 1938, p. 9, and pp. 24–5. The territory covered is the so-called "Old Reich." For 1936 it includes the Saar, but excludes Austria.

UNITED STATES. *Statistical Abstract of the United States*, 1940, p. 2, and p. 56 *et seq.*

[3] Allowing for clerical workers in manufacturing, etc., which are not included in the official figures. Quoted from the *Statistisches Jahrbuch*, *op. cit.*, 1938, p. 37.

[4] SOURCE: Censuses of Production. (Vide sources to Table I.)

[5] Computed from the *Gewerbezaehlung* for 1936, covering all firms with five or more employees. (Vide footnote 1 in the text.) The difference between the results of the Census of Production and of the *Gewerbezaehlung* is partly accounted for by differences of definitions, since the former includes also handicraft. Roughly half the difference is due to the exclusion from the Census of small firms in the printing, textile and clothing trades, also by the exclusion of the firms doing exclusively repair work in mechanical engineering, motor industries and shipbuilding. But in certain industries, all of them important in war production, like mechanical engineering, motor industry, electro-industry, optical industry and chemical industry, the *Gewerbezaehlung* shows a greater number of persons employed by firms employing fifty or more persons than the Census data indicate for firms with five or more employees. It seems not improbable that some 500,000–600,000 persons employed in war industries proper were excluded from the scope of the Census. Aircraft industry, *e.g.*, is not to be found in the Census classification.

[6] There are about 600,000 persons employed by firms employing more than ten persons, but less than fifty persons.

[7] Computed from the *Gewerbezaehlung*, corrected to include railway employees.

the number of those occupied in agriculture is relatively high. The proportion of those occupied in services is about the same in Britain and the United States, but it is lower in Germany.

(ii) The aggregate net output of manufacturing industry in the three countries, compared by taking $4·90–4·94 to the £ and

TABLE III

The Scale of Manufacturing Production in the United Kingdom, Germany and the United States

(Occupied population, employment and output)

(In index numbers)

	United Kingdom.	Germany.	United States.
(A)			
Population (1935)	100	143	272
Occupied population (last Census of Population) .	100	151	226
Population occupied in manufacturing and mining (last Census of Population)	100	132	145
Persons employed in factory trades (Census of Production)	100 (1935)	116 (1936)	161 (1935) 190 (1937)
Operatives employed in factory trades (Census of Production)	100 (1935)	114 (1936)	161 (1935) 192 (1937)
(B)			
Value of gross output produced by factory trades	100 (1935)	104 (1936)	324 (1935) 430 (1937)
Value of net output produced by factory trades .	100 (1935)	127 (1936)	320 (1935) 431 (1937)
Net output per person employed by factory trades	100 (1935)	109 (1936)	199 (1935) 227 (1937)
Net output per operative employed by factory trades	100 (1935)	111 (1936)	199 (1935) 225 (1937)
(C)	Per cent.	Per cent.	Per cent.
Occupied persons as percentage of total population aged 10 years and over (last Census of Population)	56·0	59·0	49·5
Population occupied in manufacturing and mining as percentage of total occupied population (last Census of Population)	48·0	42·0	35·0
Persons employed in factory trades as proportion of total occupied population	one-fourth (1935)	over one-fifth (1936)	one-fifth (1937)
(D)			
Proportion of females in total population 10 years and over (last Census of Population) . .	52·7	53·6	49·4
Proportion of occupied males in total male population of 10 years and over (last Census of Population)	83·1	78·1	76·2
Proportion of occupied females in total female population 10 years or over (last Census of Population)	31·3	38·8	22·0

SOURCES : Vide Tables I and II.

Rm. 17·08 to the £ as the appropriate rate of exchange for measuring relative purchasing power in 1935–37,[1] was as follows : If the output of Britain in 1935 is taken as 100, German output in 1936 was 127, the United States output was 320 in 1935 and 430 in 1937. Since German output exceeded British output in about the same ratio as German industrial employment exceeded the British, it follows that productivity (*i.e.*, output per head) of British and German industries was roughly the same, while the productivity of the United States was about twice as large.[1]

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[1] The rate of conversion Rm. 17·08 = £1 is the rate used for similar purposes by the German Institute of Business Research, and is based on their estimate of the relative purchasing power in 1935 (*Weekly Report*, June 29, 1939, p. 69). For the conversion of $ into £ the market rate was thought to be appropriate.

B. *The Structure of Manufacturing Industry* (Table IV)

(iii) The proportionate importance of the different branches of manufacturing in aggregate output produced and in total employment is fairly similar in all the three countries. The most important deviations in the order of importance of broad industrial groups are the slight preponderance of heavy industries

TABLE IV

The Structure of Manufacturing Production

Proportionate importance of different branches of industry in total output and employment.[1]

(Percentages)

Trade.	United Kingdom, 1935.	Germany, 1936.	United States, 1935.	United States, 1937.	United Kingdom, 1935.	Germany, 1936.	United States,[2] 1935.	United States,[2] 1937.
	Net Output.				Employment.			
Iron and steel	9·9	16·5	11·2	13·6	10·6	16·1	12·2	13·6
Engineering, shipbuilding and vehicles	21·0	21·4	18·3	21·3	21·4	19·4	16·1	18·4
Non-ferrous metal	2·5	2·4	3·1	3·4	2·4	1·8	3·0	3·2
Chemicals	7·4	9·9	9·8	9·5	3·8	5·0	5·2	4·9
Textiles	13·3	11·0	8·0	7·2	20·5	15·2	15·1	13·4
Clothing	6·9	4·0	7·7	6·3	10·4	5·6	11·5	10·5
Leather	0·9	1·0	1·4	1·1	0·9	1·5	1·5	1·4
Rubber	1·2	1·0	1·7	1·5	1·1	0·9	1·6	1·5
Clay and stone	4·5	6·7	3·2	3·5	4·8	9·5	3·2	3·5
Timber	3·2	4·0	4·7	5·0	3·8	6·1	8·0	8·1
Paper and printing	9·5	5·7	11·8	10·5	7·9	6·4	7·5	7·2
Food, drink and tobacco	17·0	14·0	16·5	14·6	10·1	10·2	12·3	11·4
Miscellaneous[3]	2·5	2·4	2·6	2·5	2·4	2·3	2·8	2·9
Total factory trades	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

[1] Computed from Censuses of Production data. German and American data were regrouped to cover British categories.

[2] Based on number of operatives.

[3] Includes scientific instruments, games, toys, sport requisites, etc.

The same publication of the German Institute of Business Research calculates also a dollar-mark conversion rate, on the basis of relative purchasing power, which yields a purchasing-power rate of $4·68 to the £.

[1] The exact figures of average productivity per head are: Britain, 1935 = 100, Germany, 1936 = 109, U.S.A., 1935 = 199, U.S.A., 1937 = 227.

and the relatively smaller importance of consumption industries in Germany (as compared with both Britain and the United States). This may be partly due to the much greater armament expenditure in Germany in 1936, and also to the fact that in certain consumption-goods industries (such as clothing and printing) handicraft—which is excluded from the Census—is still of great importance in Germany. In Britain textile trades are still relatively preponderant (they employ over one-fifth of the total labour force in manufacturing in Britain, but only about 15 per cent. in Germany and the United States), while in the United States the importance of timber trades and chemicals (including petrol refining) is relatively greater.

(iv) As regards *individual industries*, the most significant deviations in their order of importance are the preponderance of heavy chemicals, tobacco, stone, machine tools, scientific instruments and sugar trade in Germany, lumber and timber products, meat packing, petrol refining, non-ferrous metal alloys, rayon, paper boxes in the United States (both as compared with the United Kingdom).

C. *The Productivity per Head in the Different Countries* (Tables V, VI)

(v) We have attempted two different methods of comparison, one based on physical output per head, and the other on the value of output per head. The comparison of industrial efficiency, based on *physical* output per head in the different industries of the three countries, involved numerous difficulties. These were due to the fact that individual industries, as classified by the Censuses, each produce a group of products and by-products which are not identical in the different countries, either as regards type or quality or relative importance of individual types within the group. As a result, comparisons of physical output per head could only be made for a certain number of industries for which quantitative data were available, and the output could be reduced to homogeneity.[1]

These comparisons, which are given in Table V, largely confirm, however, the results obtained by comparing output per head on the basis of the *value* of output as shown in Table VI, that industrial efficiency—as measured in production per head—was roughly similar in Great Britain and Germany, while in the United States it was more than twice as great as in the two other

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[1] For the actual methods of measurement adopted vide note to Table V.

TABLE V

Physical Output per Head in Certain Manufacturing Industries and Mining [1]

(In index numbers)

Trade.	United Kingdom, 1935.	Germany, 1936.	United States, 1937.
A. Mainly Capital-goods Industries and Mining.			
Coal	100 (1936)	143 (1936)	263 (1936)
Blast furnaces products	100	115	361
Smelting and rolling of iron and steel	100	114	168
Iron and steel foundries	100	120	186
Iron and steel products (wire, cutlery, iron stoves, tools and implements) [2]	100	95	(400)
Machinery [3]	100	110	(280)
Cement	100	92	106
Coke	100	152	221
Printing ink	100	62	186
B. Mainly Consumption-goods Industries.			
Motor cars	100	98	419
Radio sets	100	70	482
Cotton spinning	100	120	120
Cotton weaving	100	68	130
Rayon and silk	100	132	160
Jute trade	100	106	130
Hosiery [4]	100	92	140
Boots and shoes	100	110	165
Rubber tyres	100	117	266
Breweries	100	67	164
Tobacco manufacturing	100	30	171
Soap	100	117	279
Margarine	100	81	168
Beet sugar manufacturing	100	34	162
Preserved food and vegetables [5]	100	50	145
Wheat milling	100	93	160
Total (A). Mainly capital-good industries and mining:			
Unweighted average	100	111	240
Weighted with British net output		123	256
Weighted with German net output		117	256
Weighted with American net output		116	241
Total (B). Mainly consumption-good industries:			
Unweighted average	100	88	184
Weighted with British net output		87	217
Weighted with German net output		79	195
Weighted with American net output		85	211
Grand total. All trades covered by the sample [6]:			
Unweighted average	100	97	206
Weighted with British net output		107	238
Weighted with German net output		101	231
Weighted with American net output		104	229

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[1] The above index numbers should be regarded as merely in the nature of rough approximations. It must also be borne in mind that the indices relate to output *per operative*, without any corrections for man-hours, while the normal weekly man-hours showed wide divergences in the three countries. The average weekly hours actually worked in manufacturing industry in the United States were 38·6 in 1937 (*Statistical Abstracts*, 1940, p. 336). The average weekly normal hours in the British Census trades amounted in 1935 to 47·2, and the average actual working hours in the week ended Oct. 12, 1935, to 47·8 (computed from data in the *Ministry of Labour Gazette*, 1937, p. 258). German statistics give the average daily hours in manufacturing industry in 1936 with 7·59 and indicate about 45 average weekly hours (*Wirtschaft und Statistik*, 1938, Nr. 8).

SOURCES: Data of the Censuses of Production, supplemented with other material published in the *Statistical Abstracts for the U.K.* and *Statistical Abstracts for the U.S.*, *Reports of the Secretary of Mines*, *Statistics of the Iron and Steel Industries* (British Iron and Steel Federation), *Statistical Yearbook of the League of Nations*, etc. Production data for a great many industries are published for Germany in *Statistisches Jahrbuch fuer das Deutsche Reich*, 1938 (and 1936), which were combined with Census data on employment, etc. Further German sources used were *Wirtschaft und Statistik*, *passim*, and publications of the German Institute of Business Research.

METHOD: The method followed was that of computing quantitative data of the production of comparable commodities (or group of commodities), and discovering the number of operatives producing the respective quantities. Where the trade to be compared produced more than one commodity (say coke and gas) or different types of the same commodity (shoes for men and women), they were converted into one homogeneous product, either on the basis of physical weights (as in case of steel products or tobacco products) or on the basis of their relative values (as in case of different kinds of shoes or motor-cars). For obvious reasons, there was no possibility of making allowances for qualitative differences (thus a standard American motor-car was regarded countries.[1] This takes no account of the wide differences in the number of weekly man-hours; on an output per man-hour basis, the superiority of the United States would be even greater. As regards the efficiency of labour in individual industries, Germany appears to be somewhat superior to this country in the capital-goods industries, and somewhat inferior in the consumption-goods industries; and similarly the superiority of the United States is greater in the capital-goods trades than in the consumption-goods trades.

As between Britain and Germany, the German superiority is particularly marked in coal-mining and coke manufacturing, and also (surprisingly enough) in cotton-spinning and rayon and silk production. She is greatly inferior in many important food trades, like tobacco, preserved foods, breweries, and also in

[1] It is interesting to observe that *real income per head*, as shown by national income statistics, was not significantly greater in the United States than in Britain. Thus, for 1938 (for which year comparative data are available, cf. R. Stone, " The National Income, etc., of America, 1929–41," ECONOMIC JOURNAL, June–September, 1942), U.S. income per head was $526, British income per head £98, thus the relation at the conversion rate of $4.89 to the £ was 110 per cent. From the point of view of cost of living (as against wholesale prices of manufactured goods) the appropriate conversion rate was not the market rate of $4.89, but $6.53 to the £, mainly because of the much higher level of rents in the United States (cf. data in *An International Enquiry into Costs of Living*, I.L.O., Geneva, 1931, adjusted for 1938 with the help of cost-of-living indices). On this rate of conversion, however, in 1938 American real income per head was only 82 per cent. of the British. (It should be noted that the ratios of real income per head for the year 1937 were only slightly more favourable for the U.S., as the higher per head national income was counterbalanced by less favourable conversion rates than in 1938.)

The reasons for this discrepancy between the relation of industrial output per head and real income per head have not so far been satisfactorily accounted for. The apparent reasons are (*a*) that a smaller proportion of the U.S. population is engaged in manufacturing, and a smaller percentage of the total population is occupied, (*b*) that in the other constituent elements of the national income —*i.e.*, agriculture, transport, housing, distribution—the productivity relation is not so favourable to the U.S. as in manufacturing. In particular, the fact that Britain obtains a considerable part of its peace-time food supply from abroad on favourable terms probably implies that the amount of food obtained per British man-hour is large relative both to the U.S. and Germany.

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as equivalent to a standard British or German motor-car). In order to arrive at the number of operatives employed in producing the volume of output compared, it was necessary to exclude operatives producing by-products not included in the comparisons or those doing repair work, etc. In many cases this was possible only by assuming that the net output per head within the same industry was the same irrespective of whether the operative was engaged in producing the main product, or the by-product, or was engaged in doing repair work. It is obvious, therefore, that much arbitrariness was involved in these calculations in almost every single case, and some of the indices—for reasons stated below—are highly conjectural.

[2] German volume data based on individual Censuses of 1929 and 1933, adjusted with the help of data in the 1936 Census (which contains value data only), and price indices. American index based on comparisons of value of net output produced per head of operatives.

[3] Vide footnote 2.

[4] American index partly based on comparison of the value of net output produced per head of operatives.

[5] American index partly based on comparison of the value of net output produced per head of operatives. It includes for the United States canning trades.

[6] Little less than half of the total net output is covered A more representative proportion of consumption-goods trades is covered than of capital-goods trades.

TABLE VI

The Value of Net Output per Head of Operatives in Britain, Germany and the United States

(In £, and in index numbers)

Trade.	United Kingdom, 1935.		Germany, 1936.		United States, 1937.	
	£.	Index numbers.	£.	Index numbers.	£.	Index numbers.
Iron and steel	239	100	291	122	596	249
Engineering, motor shipbuilding	270	100	339	126	686	254
Non-ferrous metal	283	100	403	142	642	227
Chemicals	617	100	651	106	1,145	186
Textiles	159	100	205	129	318	200
Clothing	168	100	218	130	356	212
Leather	237	100	270	114	417	176
Rubber	312	100	341	109	575	184
Clay and stone	238	100	195	82	588	247
Timber	215	100	192	89	369	172
Paper and printing	332	100	260	78	867	261
Food, drink and tobacco	487	100	417	86	760	156
Miscellaneous	270	100	256	95	575	213
Total factory trades	264	100	294	111	595	225

Note.—Computed from Censuses of Production data. Rates of conversion used were $4.94 to the £ and Rm. 17.08 to the £. It must be emphasised that the conversion rates were chosen to correspond to relative purchasing power in terms of commodities in general, and not (or not necessarily) in terms of the products of the individual industrial groups. To the extent the purchasing power parity in terms of these individual groups would yield different results, the figures in the above table must be considered arbitrary.

cotton weaving and hosiery. The greatest superiority of the United States is in the radio and motor-car industry, and in iron and steel products, where output per head is four times as great as in Britain, and in pig-iron production and machinery, where it is threefold. It is interesting to note that the United States has a superiority in each single industry covered by our sample.

(vi) We have also compared the *value* of net output per head for the different industrial groups in the three countries (in Table VI). On the basis of the conversion rates given on pp. 42–43 above, the results were not significantly different (with the exception of textile trades) from those obtained from the comparison of physical output. The comparison shows a German superiority (as compared with Britain) in metal trades, textile trades and chemicals, while Britain is superior in clay and timber trades, paper trades and food trades. The United States still shows a superiority in all big branches of manufacturing, and this superiority appears to be most conspicuous in the heavy industries.

(vii) It is interesting to note that *the variations of the values of output per head as between one industry and the other* are also rather similar in the three countries. The value of output per head is round the average in metal trades, it is much above the average in chemicals and food trades, and below the average in textile and clothing trades, timber trades and clay and stones. Leather, clay and paper and printing industries show relatively higher productivity (in comparison with average productivity) in the United States than in the other countries. (Too much significance must not, however, be attributed to these variations in the value of the output per head between the different industries, as they may be merely reflections of the influences which cause corresponding variations in the share of wages and the share of profits.)

D. *Long-Term Changes in Productivity* (Table VII)

(viii) The long-term trend in productivity—as measured by relating indices of physical production to indices of employment

TABLE VII

Long-term Changes in Productivity in Manufacturing Industry in Britain, Germany and the United States

(In index numbers, 1929 = 100)

	United Kingdom.			Germany.		
	Production. (1)	Employment. (2)	Output per head. (1) : (2)	Production. (3)	Employment. (4)	Output per head. (3) : (4)
1929	100	100	100	100	100	100
1930	92	93	99	78	87	90
1931	82	85	97	72	72	100
1932	83	84	98	58	60	98
1933	90	88	103	65	66	99
1934	102	92	111	85	84	102
1935	109	94	117	97	92	106
1936	119	99	120	110	101	109
1937	126	105	120	122	111	110
1938	113	102	111	133	117	113

	United States.					
	Production.		Employment.		Output per head.	
	a. (4)	*b.* (5)	*a.* (6)	*b.* (7)	*a.* (4) : (6)	*b.* (5) : (7)
1929	100	100	100	100	100	100
1930	—	83	—	87	—	95
1931	66	67	74	74	90	91
1932	—	52	—	63	—	83
1933	62	62	69	69	90	89
1934	—	67	—	81	—	83
1935	75	78	86	86	87	91
1936	—	95	—	93	—	101
1937	97	103	102	103	95	100
1938	—	79	—	85	—	94
1939	—	98	—	91	—	108

a. Censuses of Manufactures indices.
b. Federal Reserve Board indices of production and employment.

SOURCES:

BRITAIN. Production. *L. and C.E.S. Annual Index.* It excludes building and contracting. This series follows very closely the indices based on Census results for the Census years. Employment indices, constructed by R. Stone on the basis of insurance statistics allowing for unemployment. Both series quoted from Stone, R., and W. M.: "Indices of Industrial Output" (ECONOMIC JOURNAL, 1939, p. 477). Basis changed to 1929 = 100.

GERMANY. For 1933–38 indices of industrial production computed by the Office of Planning for War Economy. For previous years indices of production of the German Institute of Business Research. The former index based on indices of 153 special trades shows greater increase than other German indices of production relating to the same years (vide *Die deutsche Industrie, op. cit.*, p. 39, and *Weekly Reports of the German Institute of Business Research, passim*). Employment indices were computed on basis of data in *Wirtschaft und Statistik*, 1938, Nr. 8, and 1939, Nr. 8.

UNITED STATES. Compiled from data given in the *Statistical Abstracts of the United States*, 1940, pp. 803, 804 and 340.

in the period 1929–39—shows the greatest increase in Britain, a much smaller, though steady increase in Germany, while it was stationary (until 1939) in the United States. British productivity increased almost 20 per cent. between 1929 and 1936 (the peak year of the period covered; there was a decline in 1938). German productivity increased only 13 per cent. between 1929 and 1938. American productivity was throughout the period 1929–38, around or below the 1929 level—owing to low utilisation of capacity; the increase in productivity only began in 1939, when it increased by almost 20 per cent. in a single year and stood 8 per cent. above the 1929 level. This comparison is based on output *per person employed,* and does not take into account changes in man-hours. If the calculations were made in terms of output per man-hour (rather than output per employee) the trend would probably appear less favourable to Germany and more favourable to the United States.

E. *Composition of Labour Force* (Tables VIII, IX)

(ix) The relation of administrative, clerical and technical staff to the operatives employed is fairly similar in the three countries: 15 to 17 salaried employees per 100 operatives.[1] It is the highest in Germany (17·2), and the lowest in Britain (15). In Germany out of 17·2 salaried employees per 100 operatives, 9·5 are clerical workers, 5·2 technical employees and 2·5 working proprietors or helping family members.

Variations in the ratio of salaried employees to operatives from one industry to another are very great in all three countries (as can be seen in Table IX). Broadly speaking, the deviations from the average follow similar tendencies. Rather more than the average number of salaried employees per 100 operatives are employed in trades like chemicals, printing and breweries, less than the average is employed in industries like iron and steel, and hosiery. It is significant that the ratio is high in most of the industries where the share of wages in net output is low; furthermore, in these industries in Great Britain it is not only higher relatively to other British trades, but also to the similar trades of the other two countries. (Tobacco trades of Britain are a significant example.)

(x) Female labour has a greater importance in the manufacturing production of Britain than in Germany, and it is of smallest

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[1] These data refer to persons directly employed in manufacturing trades, and do not allow for those whose living is indirectly dependent on manufacturing, such as lawyers, accountants, advertising agents, etc. The relative importance of these indirect employees of manufacturing is the highest in the U.S.

TABLE VIII

Composition of Labour Force in Manufacturing Industry

(A) *Persons Employed* [1]

	United Kingdom, 1935.		Germany, 1936.		United States,			
					1935.		1937.	
	Thousands.	Per cent.	Thousands.	Per cent.	Thousands.	Per cent.	Thousands.	Per cent.
			Operatives					
Males	2,801·2	62·5	3,688·0	72·1				
Females	1,680·7	37·5	1,429·9	27·9				
Total	4,481·9	100·0	5,117·9	100·0	7,203·8	100·0	8,569·2	100·0
		Administrative, Technical and Clerical Staff						
Males	463·0	68·5	684·7	77·6				
Females	212·7	31·5	198·2	22·4				
Total	675·7	100·0	882·9	100·0	1,058·5[3]	100·0	1,217·2[2]	100·0
			Total Staff					
Males	3,264·2	63·3	4,372·7	72·9				
Females	1,893·4	36·7	1,628·0	27·1				
Grand total	5,157·6	100·0	6,000·7	100·0	8,262·3[3]	100·0	9,786·4[2]	100·0

[1] SOURCE: Censuses of Production (vide notes to Tables I and II).

[2] Excludes some 122,000 persons employed by central administrative offices, in 1937. No similar data are available for previous years (vide *Biennial Census of Manufactures,* 1937).

[3] Excludes persons employed by central administrative offices.

TABLE IX

Composition of Labour Force in Manufacturing Industry

(B) *Administrative, Technical and Clerical Staff per* 100 *Operatives in Selected Trades* [1]

Trade.	United Kingdom, 1935.	Germany, 1936.	United States,[3] 1935.
Iron and steel (blast furnaces, smelting and rolling)	9·9	9·7	8·3
Motor and cycle	15·2	15·5	9·6
Chemicals	30·4	26·7	18·6
Scientific instruments	17·8	22·8	31·6
Hosiery	9·2	13·6	6·6
Tailoring	12·0	23·4	9·8
Boots and shoes	7·3	13·2	7·0
Breweries	26·8	28·8	21·7
Tobacco	20·0	8·0	5·6
Total factory trades	15·0 (1935)	17·2 (1936)	14·7 (1935) 14·2 (1937)[2] 15·6 (1937)[3]

[1] Compiled from data of the Censuses of Production.

[2] Excluding persons employed by central administrative offices.

[3] Including persons employed by central administrative offices.

importance in the United States. In Britain 63 per cent. of all persons employed are males, in Germany 73 per cent., and in the United States (in 1929, the last year for which such data are available) 78 per cent. This is rather surprising, since Germany has a relatively larger female population, and a greater proportion of its female population of 10 years or over is occupied than in Britain (two-fifths in Germany and less than one-third in Britain).[1] The female population is relatively smallest in the United States, and little more than one-fifth is gainfully occupied.

The importance of female labour is greater in the consumption-goods industries (49·5 per cent. in Germany and round 56 per cent. in Britain) than in the capital-goods industries (8·9 per cent. in Germany and round 18 per cent. in Britain). There was no important change in the proportion of female labour in Germany in later years, since in 1938 the percentages were 50·3 per cent. and 9·5 per cent. for consumption-goods and capital-goods industries respectively, while it was round 28·5 per cent. for the industry as a whole.

The individual trades where female operatives are predominant are the same in the three countries; they are industries where mechanisation is well developed (some branches of electrical engineering, tobacco, cutlery), trades requiring special female skill (clothing), trades producing for mass consumption and liable to fluctuations of fashion (cosmetics, toys, paper goods, etc.)

F. *Distribution of Income in Manufacturing* (Table X)

(xi) If we select the ratio of wages in the value of net output as the most representative single index relating to the distribution of income in manufacturing, the outstanding fact is that this ratio is much lower in Germany than in the two other countries, and that it is the highest in the United Kingdom.

Since the structure of manufacturing industry—the proportion of net output represented by different industries—is very similar in the different countries (as shown in Section B), these differences are not due to the different importance of individual industries. This can be seen by calculating the shares of wages on a standardised basis—*i.e.*, weighting industries according to their importance in the United Kingdom (in 1935):

	Share of wages in net output Factory Trades. Percentages.	
	A.	B.
U.K., 1935	44·3	44·3
Germany, 1936 . . .	32·0	31·0
U.S.A., 1935 . . .	39·4	40·5
„ 1937 . . .	40·2	41·0

A = original ratios.
B = ratios on a standardised basis.

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[1] The explanation must be that there is a larger proportion of women workers in German agriculture.

TABLE X

The Share of Wages in the Value of Net Output in Britain, Germany and the United States [1]

	United Kingdom.		Germany.		United States,
	a.	*b.*	*a.*	*b.*[2]	*a.*
	Percentages.				
1923	—	—	—	—	41·3
1924	45·3	52·1	—	—	—
1925	—	—	—	—	38·8
1927	—	—	—	—	38·3
1929	—	—	—	38·2	35·5
1930	45·4	50·6	—	—	—
1931	—	—	—	—	36·0
1932	—	—	—	30·1	—
1933	—	—	—	32·5	35·3
1934	—	—	—	32·0	—
1935	44·3	48·7	—	31·2	39·4
1936	—	—	32·0	30·6	—
1937	—	—	—	30·5	40·2
1938	(43·3)	(47·6) *c*	—	31·0	—

a = factory trades.
b = all manufacturing trades, including mining, building and contracting, and—for Germany—also public utilities.
c = factory trades, and coal-mining (excluding other mining and building).

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[1] SOURCES:

BRITAIN. Figures for 1924, 1930 and 1935 based on data in the Final Reports of the Censuses of Production. The figures for 1938 were estimated on the basis of indices of output, prices, earnings and employment. Net output in 1935 was projected for 1938 on basis of changes in physical output and prices while wages bill in 1935 was projected for 1938 on basis of changes in average earnings and employment in factory trades. The following indices were used: the *L. and C.E.S. Index of Output* (excluding agriculture, mining and building) (Bulletin, 1939). Index of employment in manufacturing quoted from *International Labour Office Yearbook*, 1939, p. 36. Wholesale price indices of "industrial materials and manufactures" (excluding coal), *Board of Trade Journal*, 1939. Data of the Ministry of Labour earnings enquiry for 1935 and 1938 (*Ministry of Labour Gazette*, 1937 and 1940). The share of wages in coal-mining was calculated directly from the detailed data of output, costs and wages given in the *Report of the Secretary for Mines for* 1938. No calculation was attempted for building trades, owing to the lack of reliable price data. The figures for 1938 should be regarded as approximations, owing mainly to the imperfection of indices of production, and to the use of a price index, which includes many raw material prices. As the changes in the prices of manufactures from 1935 to 1938 were greater than the changes in the prices of "industrial materials and manufactures" (which latter index we used), we probably rather under-estimated the value of net output in 1938 and thus over-estimated the share of wages.

GERMANY. For 1936 Census of Production data (*Die deutsche Industrie*, 1939). Salaries were deducted from combined wages and salary bills by multiplying the number of salaried employees with average salaries in 1936, as computed by *Wirtschaft und Statistik* on basis of insurance statistics (1938, Nr. 8, and 1939, Nr. 8). Since employees with salaries over Rm. 700 are not insured, and salaries in manufacturing industry are higher than salaries in general, wages bills are over-estimated, and hence the share of wages should be less than indicated. For the other years the share of wages was estimated in the following manner: For 1933–38 net output was computed in *Die deutsche Industrie*, 1939, by adjusting 1936 net output with the help of production and wholesale price indices. For 1928–34 an independent estimate of net output is given (in *Konjunkturstatistisches Handbuch*, 1936, p. 46), which is almost identical with the former estimate, for the years covered by both. Wages-bill data in manufacturing industry are given in *Wirtschaft und Statistik* (1938, Nr. 8, and 1939, Nr. 8). We adjusted net output data to include depreciation, and wages-bill data to correspond to Census employment data.

UNITED STATES. Computed from data given in the *Statistical Abstracts of the United States*, 1940, p. 842. The comparability of the series is affected by two factors: (*a*) cost of contract works is not deducted from the value of net output prior to 1935, and (*b*) tobacco duties are (probably) not deducted from the value of the net output prior to 1931. By making adjustments, the share of wages would increase on both accounts (with some 0·7 per cent. and 0·5 per cent. respectively). If we make these adjustments, the results are probably as follows:

1923 . . .	42·5	1931 . . .	36·7
1925 . . .	40·0	1933 . . .	36·0
1927 . . .	39·5	1935 . . .	39·4
1929 . . .	37·0	1937 . . .	40·2

[2] As the data indicate, the share of wages in non-factory trades (especially in building) is relatively low in Germany, therefore the share of wages is higher for factory trades than for all manufacturing trades. In Britain the share of wages in non-factory trades is relatively high, and therefore the share of wages is lower in factory trades than in all manufacturing trades.

In all three countries there are very considerable variations as between individual industries, but these variations correspond fairly closely with one another in the factory trades of the different countries; whenever the share of wages is relatively high or low in Britain it is also high or low in the corresponding individual factory trades of the two other countries. (In non-factory trades such as building, this is not the case.) Taking broad industrial groups, the share of wages in the value of the net output is relatively low in the chemical and food trades, and it is relatively high in the heavy industries and textiles.

G. *Long-term Changes in the Distribution of Income in Manufacturing* (Table X)

(xii) The long-term changes in distribution of income show a slow but steady decline in the share of wages in Britain, a sharp fall in Germany at the bottom of the depression, where it was maintained at this low level ever since. There is a rising tendency in the United States since 1933. Thus while in the "plutocratic" United States the share of wages remained fairly steady between 1929 and 1933 (being 35·5 and 35·3 per cent. respectively) and has increased considerably since (being 40·2 per cent. in 1937), in National Socialist Germany it remained at the extraordinary low level of 31–32 per cent., to which it was driven from the 38·2 per cent. of the year 1929.[1] In Great Britain the corresponding figure for 1935 was 48·7 per cent.[2]

The results of the German Census of Production also show that the ratio of the profit margins to prime costs in sales proceeds—a significant index of the "degree of monopoly"—is higher in German industry, as a whole, and in all branches taken separately, than in either of the other two countries. This ratio is the lowest in the United Kingdom.

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[1] For the derivation of the German figures for various years cf. note to Table X.

[2] According to Table III, the value of output per head in the U.S. in 1935 was 199 per cent. of Britain, while the percentage of wages in net output was 89 per cent. of the British figure, as shown in Table X. This would imply that American industrial earnings, when converted dollars to the £ at the rate of 4.90, ought to be 177 per cent. of British industrial earnings. Now, according to Bureau of Labour and Ministry of Labour statistics (the latter adjusted to cover Census trades only), average industrial earnings in 1935 were 20.85 dollars and 46*s*. 2*d*. respectively—*i.e.*, an earnings ratio of 184 : 100, when converted at 4.90 dollars to the £. The fairly close correspondence of these figures does not prove, of course, that the conversion rate of 4.90 dollars to the £ was the correct one; but it shows that the figures for productivity and distribution are consistent with one another.